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and advocated in the high places of the land, it has formed no part of our present purpose to inquire. We have simply sought to show, that what is thus designated is not the doctrine of Mr. Monroe's Message of 1823, and that the principles now advocated in its name are wholly unhistorical, and without foundation in any legitimate interpretation of his guarded language. It therefore becomes unjust to the memory of that distinguished man to associate his honored name with principles which he never approved, and from which his cautious nature would have been among the first to shrink.

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- ART. X. — 1. *Prize Essay on the Use and Abuse of Alcoholic Liquors, in Health and Disease.* By WM. B. CARPENTER, M. D., F. R. S. Philadelphia: Blanchard and Lea. 1853. 12mo. pp. 178.
2. *The Physiological Errors of Teetotalism.* Westminster Review, July, 1855.

WHETHER the doctrine of total abstinence from alcoholic drinks for persons in health is based upon the established facts and principles of physiology, is a question whose scientific interest is second only to its moral importance. It was decided in the affirmative by Dr. Carpenter; and no physiologist appeared to raise any essential objection to his conclusions. A writer in the Westminster Review has, however, recently attempted to reverse his decision; and thus the question is opened anew. Many also profess to agree with the reviewer; and we therefore propose to examine his arguments,—this being the first and the sole professedly scientific and logical defence of the habitual use of alcohol, on physiological grounds, which has attracted our attention.

To use the words applied by the reviewer himself to Dr. Carpenter, "If we confine our polemics to statements advanced by him, we limit the sweep of argument, shorten the demand on the reader's patience, and avoid the necessity for the pitiable exposure of nonsense advanced by champions less

able." "Let us find the vulnerable points in his argument, and we need not waste blows on those who fight under his banner."

It is unnecessary for our present purpose to give more than a rapid glance at Dr. Carpenter's conclusions. As a warrant for the high scientific reliability of his essay, it need only be said that he is one of the most distinguished of living physiologists; that "he has never allied himself with any Temperance Society, so called"; that he has treated the subject as one of "purely *scientific* inquiry; and has avoided mixing up any other considerations with those which presented themselves to him as a physiologist and a physician."

It was the condition imposed by the donor of the prize, that the Essay should answer the following questions:—

"1. What are the effects, corporeal and mental, of alcoholic liquors on the healthy human system?

"2. Does physiology or experience teach us that alcoholic liquors should form part of the ordinary sustenance of man, particularly under circumstances of exposure to severe labor, or to extremes of temperature? Or, on the other hand, is there reason for believing that such use of them is not sanctioned by the principles of science or the results of practical observation?

"3. Are there any special modifications of the bodily or mental condition of man, short of actual disease, in which the occasional or habitual use of alcoholic liquors may be necessary or beneficial?

"4. Is the employment of alcoholic liquors necessary in the practice of medicine? If so, in what diseases, or in what forms and stages of disease, is the use of them necessary or beneficial?"

In reply to the first question, Dr. Carpenter shows that alcohol irritates and corrugates the healthy tissues, impedes the solidification of fibrine, produces changes in the red corpuscles of the blood, and causes a temporary exaltation of the nervous power. He also gives the phenomena and the pathology of alcoholic intoxication, and specifies the diseases produced by the excessive use of alcohol in the nervous system, the alimentary canal, and special organs, besides general disorders of nutrition, diminished power of sustaining injuries from disease or accident, liability to various epidemic diseases, gout and rheumatism, and morbid affections of the heart and arteries. He also states, that "no life-insurance office will accept

an insurance on an individual whose habits are known to be intemperate," experience having shown that such habits greatly shorten life, as, for instance, in the admitted fact that nearly three times as much sickness occurs among those soldiers serving in India who are not, as among those who are, members of temperance societies. From all these facts, Dr. Carpenter concludes that alcohol has an injurious effect upon the healthy human system.

In answer to the second question, the author shows that the power of enduring bodily and mental fatigue is diminished by alcoholic liquors; and that the power of enduring cold and heat, and of resisting morbid influences, is not increased by them, as is often asserted. They produce a temporary elevation of temperature, if taken into the stomach while fasting; but wholesome food containing some proportion of oleaginous elements generates still greater and far more permanent calorific effects. Dr. Carpenter concludes that "the habitual use of alcoholic liquors, in moderate, or even in small quantities, is not merely unnecessary for the maintenance of bodily and mental vigor, but is even unfavorable to the permanent enjoyment of health, though it may for a time *appear to contribute to it.*"

Dr. Carpenter admits, in reply to the third question, that in some emergencies, and where a single great effort is to be made, alcohol may prove a stimulus capable of aiding in securing the result. That its use, however, is not the best method even in such cases, is shown to be the general fact; for the secondary injurious effects are experienced in these, as well as in other circumstances. It is admitted by Dr. Carpenter, that in certain exceptional cases of debility of the stomach, and in certain infirmities of old age, some benefit may be permanently derived from alcoholic drinks in small quantities; but it is impossible to decide *a priori* in favor of such a practice in any given case, and its adoption is a dangerous experiment. We remark, however, that he who, whether old or young, has a permanent debility of the stomach, cannot be regarded as possessing a "healthy human system."

The fourth question Dr. Carpenter answers in the affirmative; and specifies the morbid conditions in which alcoholic

drinks may be administered *medicinally*. But as our present concern is with the use of alcohol in health, we here suspend our sketch of the Essay.

We now come to the article in the Westminster Review, which claims entirely to demolish Dr. Carpenter's Essay, and to prove that the habitual moderate use of alcohol is beneficial to the healthy human organism.

In a boastful exordium, the writer would at once prepare his readers to expect the speedy defeat of his antagonist. "We must," says he, "call in the aid of Logic, for we have to combat a fallacy; we must call in the aid of Science, for we have to combat a scientific error." "We have to show that the fears of the moderate are idle." He also bespeaks goodwill by the assurance that Dr. Carpenter's argument "staggered" him, "and for a time coerced his assent, until a more exact scrutiny revealed the *fons et origo* of Dr. Carpenter's error." Professing also to sympathize with the moral aspects of the temperance movement, he says: "Considered as a moral movement, it is difficult to speak of it in terms too laudatory." "We rescue a scientific question, we do not oppose the moral principles of the movement." Indeed, he virtually admits that even total abstinence is very well for the masses. "Nevertheless," he continues, "we shall restrict ourselves to the question of the use of alcohol by moderate and sensible persons. The readers of this Review [the Westminster] are obviously not of the poorer classes. Very few of them are likely to be among the intemperate; to them the teetotal arguments are impertinent."

We propose to institute a somewhat exact scrutiny of the reviewer's arguments, and to show that they are entirely fallacious. We shall endeavor to use only the weapons he has himself put into our hands; since, as he asserts of Dr. Carpenter, "it is with his own weapons he can be overthrown." But whoever makes such pretensions to science and logic prescribes to himself a most rigid adherence to facts and right reasoning; and, if found deficient in these cardinal points, he must expect precisely such treatment as science and logic may award to him.

The main object of the article under consideration is to

prove the two propositions, — first, that alcohol is food ; and secondly, that use is not abuse. All the other points raised are merely collateral to these ; for if alcohol be food, the inference seems legitimate that its moderate use is beneficial to the healthy human organism, and that therefore abstinence from it is a “physiological error” ; and if use is not abuse, and does not necessarily lead to it, the reviewer infers that the effects of an excessive, constitute no valid objection to a moderate, use.

Before proceeding to establish the propositions just stated, however, the writer specifies the “two vulnerable points” of Dr. Carpenter ; namely, “first, the confused conception he entertains of what, strictly speaking, must be called *food* ; and secondly, the fallacy of arguing from abuse to use.”

The position of Dr. Carpenter to which the reviewer first objects is, that “alcohol is essentially poisonous.” He admits that large doses of it will kill ; but this does not prove it to be essentially poisonous, since oxygen is not so, and yet an over-dose of oxygen will kill. He does not, however, inform us in what the essentiality of a poison consists ; and since his argument applies no less to arsenic and strychnine than to alcohol, — since these two substances also kill only when taken in an over-dose, — the inquiry need not at all detain us. In this connection he also sneers at the idea that the word *intoxication*, used to express the effects of alcohol, has been adduced to support its claim to be considered a poison ; and remarks that “Philosophy shrugs its shoulders at such proof.” We merely remark, that Dr. Carpenter does not adduce this fact as proof, but merely as affording a presumption in favor of the idea that alcohol is a poison, — a presumption which no philologist will fail to appreciate.

Since our writer argues in favor of the “moderate” use alone of alcohol, it is quite important that our readers should know, at the outset, what his “moderate man” is. “The moderate man,” says he, “drinks beer, or wine, at dinner, is not accustomed to anything approaching to intoxication, although he may occasionally take ‘more than is good for him,’ — which excess he sleeps off that night, — or pays for by a headache next morning, and hears no more of it.” And he

adds, "If positive science and daily experience warrant any decisive conclusions on this subject, they warrant the conclusion that to such a man alcohol is beneficial."

Now it strikes us as very singular that a writer, *professedly* scientific, should have inserted in a definition two so indefinite terms as "occasionally" and "accustomed." The former may mean once a year, or once or twice a week, according to the various interpretations of different readers; and surely the "benefit" derived from alcohol by the drinker, when "more than is good for him" is taken, must vary widely with the greater or less frequency of the indulgence. Moreover, we are not informed how often a man must experience "anything approaching intoxication," to be "accustomed" to it. "Strictly reasoning," the whole argument is vitiated by this looseness of expression. Waiving this radical defect, however, we find that the position to be proved, when divested of all non-essentials, is this: Positive science and daily experience warrant the conclusion, that if a man drinks beer or wine at dinner, (it being understood, we suppose, that he gets a dinner every day,) yet is not accustomed to anything like intoxication, though he *occasionally* takes "more than is good for him," but sleeps off the effects that night, or merely feels them in the form of a headache next morning, — to him, though in perfect health, the use of alcohol in this way, and to this extent only, is *beneficial*. For, (1.) Alcohol is food; and, (2.) Use (such as this) is not abuse, and does not necessarily lead to abuse.

The proposition that alcohol is beneficial where the drinker takes "more than is good" for him, we need not very seriously discuss. Just so often as that amount is taken, alcohol, we suppose, is not beneficial. The general proposition therefore, that "to such a man alcohol is beneficial," is marred in the very making.

We omit the reviewer's comparison of the effect of alcohol on the constitution to that of a weight upon a spring, which at once rebounds when the weight is removed, — and to the effects of heat, and oxygen, and even of "mutton chops," upon the tissues, — as a mere fallacy; since no real analogy exists in the things compared. Indeed, the reviewer him-

self "begs the reader not to lay too much stress on these illustrations, or to suppose the writer offers them as arguments." They, in fact, subserve no other purpose than to throw dust into the reader's eyes at the outset.

The following sentences are also adapted to give the reader a false impression. "Whatever air of paradox may hover round the assertion that alcohol is food, arises from the popular ideas of food, which are extremely vague and confused. To the popular mind it would be equally paradoxical to say, iron is food, salt is food, chalk is food; the popular idea of food being limited to substances which eaten by themselves 'nourish' and allay hunger. — *Nous avons changé tout cela.*" "No one would think of nourishing a pigeon on chalk, yet the celebrated experiments of M. Chossat prove that pigeons deprived of chalk die of inanition, first suffering from a complete softening of the bones."

Thus the idea is suggested that alcohol, like iron, salt, and chalk, is essential for the nourishment of the tissues. But iron is indispensable, because it is always naturally present in the blood and some of the tissues; salt normally enters into the composition of all the fluids and tissues of the body; and chalk (carbonate of lime) is necessary to the development and nourishment of bone. Alcohol, on the other hand, is not essential to the development of any part of the body; and, still more, not a particle of alcohol can by any means be converted into any tissue whatever. There is, therefore, no physiological analogy in the things compared, and the illustration can only mislead the reader. On the contrary, if iron, salt, and chalk are food because they enter as elements into the normal composition of different tissues, then alcohol is not food, as it enters not thus into a single tissue.

But we now proceed to examine the reviewer's arguments in support of his principal proposition, that "alcohol is food." It occurs to us as a striking fact, that in their whole course he does not quote a single physiologist in opposition to Dr. Carpenter, except in the use of two or three unimportant extracts from Moleschott's work, but relies on the testimony of chemists alone. Liebig is the authority almost exclusively cited. The accuracy of his opinions on the phys-



iological bearings of this subject will be tested as we proceed.

The reader will the more clearly perceive how inconsequent and fallacious are our reviewer's conclusions, if it be remembered that he attempts to show, first, that "food is force," secondly, that "alcohol is force," and therefore, thirdly, that "alcohol must necessarily be food." We shall examine his arguments in proof of each of these propositions.

"Science teaches us that food has to be considered under three aspects:— 1. It repairs the waste of tissue consequent on the wear and tear of life; 2. It furnishes fuel for respiration, the main source of animal heat; 3. Under both these heads it is the generator of force."

Now, though the first two of these assertions just quoted are physiologically correct, the three together do not include all the physiological relations of food, and the last is untrue. Certain elements of our food repair the waste of the tissues, and are hence termed nutritious or plastic elements. These are albumen, caseine, fibrine, etc., and these alone are properly called *nourishment*. Other elements do not at all repair the tissues, but being acted upon, after they are digested and absorbed into the blood, by the oxygen derived from respiration, they are literally burned up, and thus, producing heat, aid in maintaining the normal temperature of the body. Hence they have been termed "fuel for respiration," "respiratory material," and, better still, "the calorific elements of our food." They are starch, sugar, gum, and dextrine. The fat in our food, too, is in great part merely calorific; though it is also nourishment so far as it contributes to the development or the repair of the adipose tissue. But the author has entirely overlooked and ignored the residual elements of our food, which traverse the alimentary canal without undergoing any change whatever.

As a specimen of our reviewer's scientific accuracy in the use of terms, we call attention to the fact, that in the passage just quoted he states that both the plastic and the calorific elements of food *generate* force; a little farther on he says, "all food is ultimately *translated* into force"; and still farther, that alcohol, which he asserts is food, *evolves* force; and again, that Dr. Carpenter knows that alcohol "*gives* force." Now

these four terms are very far from being identical in meaning; and no two of them are so. Which, then, expresses the writer's actual meaning? But we need not lose time in attempting to settle this question, since it will appear that neither of the words used is at all consistent with the facts. Moreover, in regard to the kind of force, he says at first, "into *motive* force all food is ultimately translated." Afterwards he says, alcohol (being food) "is translated into *nerve* force"; and again, "into nerve force or some *substitute* for nerve force." Are nerve force and motive force, then, identical? and is there any such thing as a substitute for nerve force? Our scientific champion evidently entertains conceptions somewhat "confused" of what, "strictly speaking, must be called" nerve and motive force.

But next let us adduce the facts which decide whether any, and if so which, of the elements of our food are generators of force. And, first, the *residual* elements, overlooked by the reviewer, are surely not generators of, nor translated into, force of any description; though they constitute a considerable and an indispensable part of the food of all the higher animals. To this class belong woody fibre, resinous matters, the envelopes of fruits, and the husks of seeds (as the bran of wheat, &c.); all of which pass unchanged through the alimentary canal. The precise uses of the residual elements of food are explained in every extended treatise on physiology, and need not detain us here. Nor, secondly, are the *calorific* elements of food translated into force. They are converted into carbonic-acid gas and water by the action of oxygen, as already explained; and this union of oxygen with their elements, being chemically a true combustion, produces heat, precisely as does the union of the oxygen of the atmosphere with the carbon and hydrogen of coal when it is burned in a grate. And this is all. The calorific elements of food are finally "translated into" carbonic acid and water, and thus produce heat. But heat is not motive force, nor nerve force, nor a substitute for the latter. It is merely a physical agent, while both the forces just named are vital forces. The idea that mere heat can be converted into any phase of vital force is preposterous; and the reviewer neither attempts to prove, nor

even insinuates, anything of the kind. Nor, thirdly, can it be said with accuracy that the *plastic* elements of food are translated into force; though if they are so, the fact is of no consequence to the reviewer, since he admits that alcohol does not belong to this class of elements. The simple fact is, that the plastic or nutritive elements of food are converted into the various tissues, and that each of the tissues manifests its own peculiar phase of vital force, — the muscles, contractile or motive force; the nervous centres, nervous force, &c. The tissues are excited to the manifestation of vital force, each by its appropriate stimulus; but the tissues themselves are in no case “translated into” force. They merely constitute the organization, the peculiar mechanism, by means of which vital force is manifested, as does the engine the mechanism by which physical force is manifested; and in the former, as well as in the latter case, the wear and tear are proportioned to the amount of activity, or of force developed. We perceive, then, that precisely the reverse of our reviewer’s cardinal proposition is rigidly true; namely, that no part of our food is translated into force. It follows, therefore, that, if alcohol is translated into vital force, it cannot be food; and that, if it actually is respiratory food, it cannot be translated into vital force, but can only produce heat by its combustion in the blood.

The reviewer, supposing the reader to be satisfied that all food is force, next announces that “Alcohol is Force.” He, however, merely asserts in support of this proposition, that “Dr. Carpenter knows better than most people that alcohol gives force.” We wait, however, for the admission from Dr. Carpenter himself. Every one knows that alcohol, taken in a sufficient quantity, *excites* force; but this is a very different thing from *giving* it. The spur on the rider’s heel excites force, but does not give it. Hay and grain, moreover, do not excite the force of the horse in this way; and none would contend that the spur is a part of the animal’s food.

But we now come to the most remarkable portion of the article under consideration, — at least so far as its logic is concerned: “The reader has already outrun our conclusion, that, if food is force, and alcohol is force, alcohol must necessarily be food.” Since the high character of the Westminster Re-

view precludes the idea that this syllogism was intended as a transparent joke, we will crave the reader's patience while we illustrate its singular capabilities. "Food is force; and alcohol is force; therefore alcohol must be food." By this logical formula we may prove that any two things possessing a single property in common must be the same generically and specifically. Thus: "Man is an animal, and a horse is an animal; therefore a horse is a man." And again: "Chalk is white, and snow is white; therefore snow is chalk." But we are mainly interested in the number and variety of its applications to the subject under consideration. Indeed, it proves so much as entirely to demolish our logician's favorite conclusion. First we have, "*Alcohol is food*," according to the original formula. But, 2. "Alcohol is force, and food is force; therefore *food is alcohol*." 3. "Food is force, and arsenic is force;\* therefore *arsenic is food*." 4. "Alcohol is force, and arsenic is force; therefore *arsenic is alcohol*." But enough of such "calling in the aid of logic to combat a fallacy." Logic "shrugs her shoulders" at such reasoning as this; and we proceed to examine the curious structure of the "links of the chain of demonstration" of the proposition that "alcohol is food."

The reviewer first cites a passage from Dr. Carpenter's treatise on Physiology, which, he says, is "addressed to men of science," and asserts that it contradicts his Essay on the effects of alcohol, thus placing Dr. Carpenter, as he assumes, in the very ungracious position of "himself maintaining that alcohol is food, not poison; unless Dr. Carpenter retracts his own language, unless he withholds the name of food from all substances not forming tissue."

We hold the insinuation that Dr. Carpenter has spoken the truth, when obliged to do so, in a work addressed to men of science, while he intentionally suppresses or perverts it in a more popular essay, to be simply contemptible. Our reviewer "knows better than most people," that Dr. Carpenter's scientific reputation is as much concerned in his work on the

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\* The reviewer states that arsenic "gives to both horses and men increased vigor, increased beauty, and an enviable rejuvenescence, when taken regularly in minute doses."

physiological effects of alcohol, as it is in his work on physiology in general. He is also doubtless aware, that, if there is an apparent contradiction in these two works, candor requires that he should regard the Essay on this special subject as embodying Dr. Carpenter's more mature views of the effects of alcohol, and those which he is prepared to defend. But a fair interpretation does not suggest to the reader even an apparent contradiction. On the page containing the passage quoted by the reviewer, Dr. Carpenter classifies "the organic compounds *usually employed as food* by man," under four heads, — the Saccharine, Oleaginous, Albuminous, and Gelatinous; and, speaking of the Saccharine, has the passage alluded to: "To this group belong starch, gum, woody fibre, and the cellulose of plants, which closely resemble each other in the proportion of their elements, and which may be converted into sugar by chemical processes of a simple kind, whilst *alcohol*, which is derived from sugar by the process of fermentation, has a *composition* which rather connects it with the next group."\* But Dr. Carpenter is not here deciding the question what is food, physiologically considered. He is merely classifying the "compounds *usually employed as food* by man"; and after specifying starch, gum, woody fibre, and cellulose as food, he adds that alcohol is unlike these compounds both in its origin and its chemical composition, and in the latter respect is more nearly allied to the Oleaginous group. He does not intend to say here that alcohol is food, or is not food, physiologically considered. It is often taken with food by man; and he means to say of it precisely what he does say, and nothing more, — though certainly his remark suggests the inference that it cannot be properly classed with the elements of our food. In his other work, however, he discusses that question at length; and decides that, physiologically speaking, alcohol is not food. This "link of the chain of demonstration" therefore fails entirely.

The reviewer next quotes Liebig: "The amount of nourishment required by an animal for its support must be in a direct ratio with the quantity of oxygen taken into the sys-

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\* Principles of Human Physiology, Fifth American Edition, p. 376.

tem"; and adds, "But under the term nourishment our readers have learned to include alcohol, which nourishes as fuel." Liebig is also quoted and commented upon as follows:—

"Of all respiratory [calorific] matters, alcohol acts most rapidly,' [i. e. is most rapidly consumed,] says Liebig; and in this rapidity there is great virtue, for starch, very good food in itself, requires some hours before it becomes soluble in the alimentary canal of the bread-eater, so as to enter the blood, and there serve the purposes of respiration. Both starch and alcohol are burned, and in burning throw out force; but when the demand for force is urgent, the food which most rapidly creates it is the most valuable."

It is here proper to inform the reader, that alcohol is capable of producing three entirely different effects, in proportion to the amount taken into the stomach. If a very small quantity, well diluted, be taken when the stomach is nearly empty, (one drachm, perhaps, in the case of most persons,) it is very rapidly burned up by combination in the blood with oxygen, and thus produces heat, it being converted into carbonic-acid gas and water. Only under these circumstances is Liebig's assertion true. If a larger dose be taken, so as to be felt at all in the head, it has a stimulant, and not a calorific effect. In this case it *excites* force; in the other, it *produces* heat merely. In a still larger dose, alcohol becomes a narcotic, and produces the stupor characteristic of the narcotic poisons. In this case, it paralyzes force, and at the same time, instead of proving calorific, perceptibly diminishes the heat of the body. It is therefore only when alcohol ceases to be alcohol, or is burned up, that it is calorific; so long as it remains in the blood unchanged into carbonic acid and water, and manifests its real character, it is either stimulant or narcotic, according to the quantity taken.

These facts are ignored by the reviewer; and from Liebig's unqualified assertion that alcohol is rapidly burned, he deduces the inconsequent conclusion that it is better food than starch and sugar, after repeating the groundless assertion that starch and sugar in being burned throw out force. To make the last sentence quoted from Liebig even theoretically true, we must read it thus: "Both starch and alcohol are burned, and in burning throw out heat; but when the demand for heat is

urgent, alcohol, as creating it the most rapidly, is the most valuable." Of course, in all other circumstances, starch is the most valuable. Practically, however, the sentence, even as altered, is not true. For, in order to prove merely calorific, alcohol must be taken in very small quantities; and it is so rapidly burned up, that the small doses must be almost incessantly repeated. Even thus, if we may credit our reviewer, we cannot long keep up the supply; for he says, "Alcohol is not, and cannot be, continually present in the blood"; and adds, that, if this were possible, it would produce a fatal effect. Not very reliable, valuable, or safe food this, we think! Starch and sugar are far better; since they may always be kept on hand in the blood, and never produce any dangerous effects. If it require "some hours" for the last-mentioned elements to enter the blood of the bread-eater, he has only to take another meal the same number of hours (as we all do) before the proceeds of the preceding one are consumed, and he will always have a sufficient amount of fuel on hand. Alcohol, therefore, if it is food at all, is so because, like starch and sugar, it is a producer of heat, and not because it is force, or an exciter of force. So far as it affects force, it is a stimulant or a narcotic, and in no possible sense food.

But the reader may ask, What is the physiological objection to recognizing alcohol as food, since, like the amylaceous and saccharine elements of food, it is, in the circumstances mentioned, a producer of heat? We answer, that the *characteristic* physiological effects of alcohol are its stimulant and narcotic powers; it is calorific only incidentally, and when taken in doses not sufficient to manifest its essential character. In its calorific capacity, we have seen, too, it is utterly incapable of sustaining that equable temperature of the organism required for the highest development of the vital force. We have also seen that, even were it a valuable calorific element, this fact does not really concern us in our present argument, since "the moderate man" uses alcohol in stimulant doses at least, as the reviewer admits, and thus the idea of its being food, like starch and sugar, is entirely precluded. Moreover, if the reviewer adopts the proposition that everything is food that is calorific, it is one altogether too pregnant

for his purpose. If alcohol is food merely because it is caloric in certain circumstances, so are ether, and many of the essential oils ; and the reviewer, if consistent, must also add these to his bill of fare. Physiologically considered, then, alcohol is a stimulant and a narcotic, and is not food.

Having previously asserted without the least warrant, as we have seen, that alcohol is nourishment, the reviewer next gathers strength to make the extraordinary statement, that “the *digestibility* of alcohol (so to speak) surpasses that of any other aliment ; it requires less elaboration to fit it for its ultimate purpose, namely, its translation into nervous food.” Hitherto we have been told that all food (and of course alcohol) is converted into motive force. But this discrepancy has already been alluded to ; and whether the reviewer is ignorant of the difference between motive force and nerve force, or is here unfairly substituting the latter term for the former, the reader may decide. But what is “digestibility (so to speak)” ? This is a somewhat ambiguous expression for a scientific writer. Digestibility has reference to the ease and rapidity with which food is digested ; but alcohol is not digested at all. It is absorbed into the blood from the stomach and the lower portions of the alimentary canal, without undergoing any previous change. We therefore make no further comments on the preceding quotation.

The third link of the chain of demonstration is thus constructed : “ ‘ Alcohol stands high as a respiratory material. Its use enables us to dispense with starch and sugar in our food.’ (Liebig.) Is more wanted,” demands the reviewer, “to show that alcohol is food ?” Besides, the reviewer informs us, that the members of the Peace Congress at Frankfort ate an enormous amount of pudding, because they drank no wine. For “wine replaces pudding,” and “pudding replaces wine” ; but “poisons have not the property of replacing wholesome food.” Therefore alcohol (wine\* rather) is food. “Wine replaces pudding,” which is doubtless food ; and “therefore wine is food.” But pudding also replaces wine, which is

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\* Wine contains only from nine to about twenty-six per cent of alcohol ; the remainder being water, sugar, acids, &c.



doubtless a stimulant; and therefore, by the same reasoning, pudding is a stimulant !

But let us examine these propositions in detail. And, first, has Liebig or any one else known an alcohol-drinker entirely to dispense with the amylaceous and saccharine elements in his food ? It would certainly require more than a "moderate use" of alcohol to replace all of these elements. But the reviewer also says, in another connection, that alcohol "cannot be continually present in the blood." What would then ensue, if starch and sugar were dispensed with, when the alcohol failed ? Death, we suppose, from the entire loss of animal heat. How then can the reviewer say, from Liebig, that alcohol "stands high" as a respiratory material ? According to his own statement, it is superior to starch and sugar only in the fact of burning more rapidly ; a quality which has been shown to render it unfit for calorific purposes, in an organism where a steady and uniform temperature is demanded. We should add, however, that we have quoted the reviewer's assertion that "alcohol cannot be constantly present in the blood," only in order to allow him to refute himself ; the fact being, that it can be kept constantly present in the blood during an indefinite period, if the doses be often enough repeated. So long as a person exhales the odor of alcohol in his breath, he is exhaling alcohol from the blood as it circulates through the lungs, and so long it is of course present in the blood ; and every one knows that some persons exhale alcohol in every expiration for weeks at a time. Our writer, however, asserts that, if the blood could be kept constantly charged with alcohol, it would produce fatal effects ; and this assertion with some qualification is true. But, again to reverse his argument, "it is not the property" of wholesome food to produce fatal effects merely from being constantly present in the blood ; therefore alcohol cannot be food. Besides, if alcohol is food because it "replaces" food, in some sense arsenic is also food ; for, as the author asserts, a given amount of food with "regular doses" of arsenic added confers both on horses and men increased fulness of form and vigor, while the food alone would not have this effect. The reader must not, however, be surprised at this conclusion ; since we have previously

shown that arsenic is food by another formula which the reviewer has afforded us.

Our reviewer continues his reasoning as follows : —

“ If we reflect that alcohol is respiratory food, and that the organism needs five times as much respiratory food as plastic food, we may be able to explain the notorious fact of hard drinkers scarcely taking any ‘food’ (except their drink), and yet, in spite of this absence of ‘food,’ they manage to live on through many years, performing all their functions, not very vigorously it may be, not as highly reputable citizens, but nevertheless *living*, and upon a quantity of ‘food’ so small that life could not be sustained a month on such a quantity, did they not call in the aid of a poison. This paradox it was incumbent on Dr. Carpenter to clear up.”

Then the writer quotes Dr. Carpenter’s assertion, that mere alcohol does not contribute to the renovation of muscular tissue, and his reasons also for believing that it cannot be converted into nerve tissue. In respect to these points, however, he accuses Dr. Carpenter of “confusion,” and objects that he “limits” nutrition to the tissue-forming process. So, we reply, does every other physiologist; though he says, “no one knows better than Dr. Carpenter the error of such a limitation.” Having thus a second time groundlessly alleged a perversion of the facts, his audacity culminates in the assertion, that Dr. Carpenter “shifts a question of force to one of tissue.” We will only assert, on the contrary, that the reviewer himself has shifted a question of *tissue* to one of *force*. “The point in debate is not,” he says, “whether alcohol can be converted into nervous *tissue* (which may or may not be the case), but whether it can be converted into nervous *force*.” Who raises such a question as this? Its palpable absurdity does not admit of its being entertained by a physiologist for a moment. Surely, if such a question can be raised, it was incumbent on the reviewer to answer it in the affirmative, if possible, earlier in the progress of his article. He has, however, so often asserted that alcohol is “force,” is “motive force,” &c., that he now seems to think the reader will accept the implication on his part that alcohol may be “converted into nervous force,” as a proof that it is really thus converted. But the intelligent reader, who has become accustomed to our writer’s style of

logic, requires no caution in this respect; and we need only to notice the statement in regard to hard drinkers living for years upon nourishment insufficient to sustain them a month without their drink.

If this be asserted of hard drinkers of alcohol merely (with water), it is unqualifiedly untrue. If it were true, however, it would be logically so much the worse for our writer; since, if alcohol is "food" and "better than starch and sugar," is a "nourisher of force," and is "converted into nerve force," surely hard drinkers, who consume so much more than others of this multipotent substance, ought to live "vigorously," and as the most "reputable citizens." If alcohol is converted into nerve force, such people ought surely to develop the highest functions of the nervous system, — the intellectual and the moral faculties, — in a superior degree; which is generally thought not to be the case with hard drinkers. "This paradox it was incumbent on" our reviewer "to clear up." If what he has already affirmed of alcohol were true, it would be an unpardonable sin to restrict a man who can pay for large potations to a "moderate" use of it. On the contrary, every one, by keeping his blood charged with it to the utmost extent, might elevate his moral and his intellectual nature to that angelic height, "a little lower" than which he was at first created. And for a man to be addicted to such slow food as starch and sugar, — in a word, to eat "pudding," — would, on the other hand, be the seal of abject and perpetual barbarism. But the reviewer proceeds to say also, that alcohol offers itself to oxygen and is burned, and thus produces nerve force; while it at the same time saves nerve tissue. Does not the reviewer know that the mere burning of alcohol in the blood produces heat alone, just as does the combustion of starch and sugar? and that nerve force is developed by nerve tissue alone, and at the expense (wear and tear) of the latter? If not, we tender our regrets. But his enthusiasm comes to its climax farther on, in the assertion that alcohol is also "the equivalent of blood." On this pinnacle of absurdity we leave him, with our best wishes for a safe descent.

Now in regard to hard drinkers, there are those who are constantly stupefied with alcohol, and who therefore wear out

their tissues very slowly, and require but little nourishment to repair the waste. This class is formed of beer and porter drinkers more especially ; such persons requiring less food because malt-liquors contain a small amount of nourishment, in the form of albuminous matter. Liebig, however, says that "as much flour or meal as can lie on the point of a table-knife is *more* nutritious than five measures (about eight or ten quarts) of the best Bavarian beer." Our reviewer remarks upon this quotation, that the proposition is "absurd," that "a pinch of meal has greater *sustaining* power than a *quart* of beer." Liebig, however, says, "We can prove the above statement with mathematical certainty." The reviewer also asserts, that "it is no answer to say that the force is temporary. All force is temporary." Indeed ! and so is all life. He afterwards tells us, in like manner, "All excitement is temporary"; but subsequently claims in favor of alcohol that, in small doses, it is "*only a temporary* stimulus." By what term might we appropriately designate this style of subterfuge ?

But there is another class of excessive drinkers who are constantly stimulated, instead of being stupefied, by the alcohol they consume ; and who are therefore still active, developing motive force and nerve force at the expense of their muscular and nervous tissues. Such persons need nourishment in proportion to the waste ; and in many cases the quantity is decidedly increased, instead of being diminished, by their drinking. This explanation is virtually admitted by the reviewer himself, while discussing another topic, where he says, in a style uncommonly subdued : "We think that, although the result of the stimulus *may* be a greater consumption of tissue in a given time than would have taken place without it, yet it is demonstrable that real increase of strength *is* given ; that alcohol is positive nutriment, or else it could not replace nutriment, nor could it enable drunkards to subsist." Dr. Carpenter thinks precisely the reverse, and gives his reasons ; and until the reviewer can offer some valid ground for his opinion, we shall adhere to Dr. Carpenter's opinion (and our own) on this subject.

Here end our comments upon the "links of the chain of demonstration" ; and we believe the reader will now agree

with us, that the "chain" is merely a "rope of sand," and that Physiology "shrugs her shoulders" in general, and in particular, at the "conception" that "alcohol is food." On the other hand, Dr. Carpenter has given solid reasons for regarding alcohol as essentially poisonous in its physiological effects; and with him we may very safely leave this question, till a more doughty champion enters the lists against him.

Our reviewer, however, coolly assuming to have proved that "alcohol is food," next proceeds to show "how and why it is food." It is scarcely necessary to follow him through his argument on this topic; and yet some of his illustrations are too characteristic to be omitted. "If in drinking a glass of brandy," says he, "you save an ounce of beef, it is because the same amount of force can be evolved from the brandy as from the beef." But the reader now knows that the glass of brandy, if it evolves force (as the beef is assumed to do), does not save the beef; since it thus wastes the tissue, and the beef is just so much the more required to repair the tissue. His idea that the alcohol offers itself to oxygen and is consumed, and thus saves tissue, though it nevertheless develops force, next follows; but it has been refuted on a preceding page. The great defect here, as elsewhere, is, that the reviewer makes no distinction between the calorific and the stimulant or exciting effects of alcohol; but persists in implying that the mere burning of it in the blood produces force, instead of heat merely. The reader now knows, that, whenever alcohol does offer itself to oxygen, it is merely calorific; and that when, remaining unconsumed in the blood, it excites force, it produces a corresponding waste of tissue.

As if cherishing some misgivings, after all, in regard to his demonstration that alcohol is food, and not poison, the writer dismisses the last-mentioned topic with some very striking remarks on poisons in general; from which we may infer that, on the whole, it is of no consequence if alcohol is a poison. He says that the human organism possesses a marvellous "aptitude in resisting and making light of poisons," and discourses thus:—

"We are all in a private way descendants of Mithridates. The water we drink, the tea we drink, the medicines we take, and the

pickles — especially the pickles! — we eat, are all so many poisons. Death itself is but the consummation of a system of slow poisoning. There is tea, even when unadulterated, notoriously a slow poison; coffee, a slow poison; tobacco, a slow poison; carbonic acid in the air of churches, theatres, and assemblies, a slow poison; beer, slow poison; wine, accelerated poison; brandy, rapid poison."

A sufficient reply to the above is afforded by the reviewer's previous assertion, that, if alcohol were continually in the circulating current, the effect would be fatal. But he says, incorrectly, "Alcohol is not, and cannot be, constantly present in the blood"; and, "Its temporary presence is only a temporary disturbance, and this disturbance is a stimulus." We reply, with his own logic, "All disturbance is temporary," and there is no substance whose presence in the blood is not "temporary." But we have seen that alcohol, if often taken, may be kept present in the blood for a long time; and in numerous instances it has been found after death in the ventricles of the brain, and has burned with its characteristic blue flame. It has also frequently been extracted from the substance of the brain, when it could not be found in the ventricles or in any other part of the body. But this is a mere "temporary" presence!

We have, however, in the preceding quotation, arrived at the first distinct admission that alcohol is a stimulant ("stimulus"); which is in fact the only property of alcohol which makes its habitual use intensely dangerous, and upon which the whole doctrine of total abstinence rests. It is not necessary to show that alcohol is a poison; it is enough to show that it is a *peculiar stimulant*, and then to indicate in what its peculiarities consist. So long as it is merely calorific, nobody is concerned for its effects. The reviewer himself asserts, that since "life is only possible under incessant stimulus," there is no objection to alcohol unless "there is something peculiar in the alcoholic stimulus, which demarcates it from all others"; but he also admits that alcohol is a peculiar stimulus, and thus nullifies all that he has said of the other stimuli as essential. He says also, that this peculiarity of alcohol "justifies, in some degree, its bad reputation," and is one "upon which all the mischief of intoxication depends, one which causes all the

miseries so feelingly laid to its door." (All this is affirmed, by implication, of *food*!) "And what," he continues, "is this peculiarity? Nothing less than the fascination of its virtue, the potency of its effect! Were it less alluring, it would not lure to excess; were it less potent, it would not leap up into such flames of fiery exaltation. In its virtue lies its crime." Observe, "virtue" here means "potency of effect." He next suggests that alcohol should be used as is a razor; and says, that "while we frighten Tommy with a rehearsal of the terrible consequences which may ensue if he venture to touch the razor, we cease the precaution when our juvenile friend emerges from jackets to the dignity of shaving," and "the razor is then placed in his hands with full reliance that he will not cut himself—often." Or, to state the idea more distinctly: We should frighten children and people of the "poorer classes" from using alcohol at all, even in a "beneficial," "moderate" way; but we should put it into the hands of "sensible persons" (the "readers of the Westminster Review") for their habitual use, "once or twice a day," with full reliance that they will not become intoxicated by it—often!

It would have been pertinent had the reviewer explained why alcohol is a peculiar stimulant. It is so because it has a peculiar attraction for the substance of the brain, and therefore commits its ravages first of all upon this organ, and consequently upon the intellectual and moral faculties. This fact is confirmed by the examination of animals killed by alcohol. Indeed, the reviewer himself admits (though for a very different purpose) "the great affinity and the *selective eagerness* with which it acts on the nervous tissue."

Professor Johnston, another chemist, is next quoted to prove that the stimulus of alcohol is not in itself injurious, but beneficial, though the reviewer adds, "Too much of it we know to be injurious." It would have been at least kind, had he, after portraying the dangers from its use, informed the reader how much is just enough. What would we think of a professedly scientific medical writer, who should urge the use, in some disease, of a drug he admitted to be dangerous in excess, without giving us any idea of the dose in which it should be administered?

The reviewer also quotes from Professor Johnston the absurd idea, first propounded, we think, by Liebig, that alcohol, coffee, tea, &c. "diminish the waste of tissue," though an equal amount of force is developed. It is high time this absurdity were given up, even by chemists. Physiology, except as manufactured for us in the laboratory, entirely repudiates such a chimera. Our writer also adopts the saying of the "poets," that wine is "the milk of the old," and then quotes Liebig to the same effect. While we cherish the profoundest respect for Liebig as an analytical chemist, we must admit that there is a certain propriety in associating so imaginative a writer on this subject with the poets. We however by no means deny that wine is often beneficial to the aged, or to any whose weak digestive powers require its stimulating effects. We do not ourselves hesitate to prescribe alcoholic drinks when we think them needful. But we have nothing here to do with alcohol as a medicine; and therefore the authorities just referred to have no bearing on the question before us. We find, however, an admission on a subsequent page, which seems singular as coming from a writer who maintains that the use of alcohol "once or twice a day" is "positively beneficial" to a man in health. If, says he, we are "living under perfectly healthy conditions, with hereditary strength of organism, with abundance of excellent food, with stomachs equipped for efficient exercise, — in such a case alcohol is certainly of *no use*." We are happy to find the reviewer at last strictly correct, on this one point. But he adds: "In such a case alcohol in moderation can do no injury, — because of the elasticity of the organism, — and while it does no injury, it produces pleasure." The "potency" and the "fascination" of alcohol have been portrayed in dithyrambic style; we have just been told that in perfect health it is not beneficial (is of "no use"); but it is added, that so powerful an agent in such a case is also not injurious. That is, to one in health it is neither injurious nor beneficial, though so powerful. Yet we know that it is often beneficial in disease; and we should expect that it would, like other remedies, produce some effect at any rate, and probably an injurious one, in health. Dr. Carpenter has shown that this is the fact. But



alcohol "produces pleasure." We should say "excitement," instead of pleasure; but it is very true that some make pleasure to consist in excitement. Yet we have seen that in the fact that alcohol is a *peculiar stimulant* lies all the danger. Is it, however, pleasure to be excited to-day, and "sleep it off" to-night, or only "pay for it by a headache to-morrow"? Let the reader say for himself.

The closing pages of the article under consideration are devoted to the reviewer's second proposition,—"Use is not abuse"; or, "There is no *necessary* physiological connection between moderation and excess." Of course there is no physiological necessity or reason why a healthy person should take alcohol for the first time; there is equally none for taking it the second time, or the ten-thousandth. But our writer "knows better than most people" that it is the physiological fact that moderation tends to excess,—that use tends to abuse; for he admits that "He who drinks will drink again, and moderation, we know, oils the hinges of the gate leading to excess. No one doubts the danger. The only absolute preventive against taking too much is to take none." "Is anything more wanted" to show that, if excess does not necessarily follow moderation, there is great danger that it will? And this danger, the reviewer himself admits, can be avoided only by abstinence. We must therefore regard the reviewer as "himself maintaining" that total abstinence rests on a physiological basis, "unless he retracts his own language." He however adds: "Stimulus [i. e. alcohol] is daily taken by thousands and thousands who do not increase the amount as they advance in life"; to which we reply, that there are millions who do increase the quantity as they advance in life. The reason is simply, that, as the organism becomes accustomed to the stimulus, a larger quantity is required to produce a given stimulating effect.

Finally, the reviewer, in taking a retrospect of his labors, states five propositions which must be proved to establish Total Abstinence as a scientific theory; but which, he says, he has entirely disproved. These we need not repeat, since with his method of proof the reader is already familiar. On the other hand, we assert that Total Abstinence may be defend-

ed upon the basis of the two following propositions alone :—

1. Alcohol does not exert a beneficial effect upon the healthy human organism; and, 2. Use tends to abuse. Both these propositions have, moreover, been established by Dr. Carpenter; and the reviewer himself, as we have seen, has virtually admitted them. We may therefore retort upon him his remark respecting Dr. Carpenter: “We have only to disentangle the confusion” of his article, “and we find him an ally.”

In taking our leave of the reviewer, we merely add, that we have found that his “vulnerable points” constitute the rule, and not the exception; we have “called in the aid of logic to combat fallacies,” and of “science to combat scientific errors”; and have made it apparent that he has very “confused conceptions of what, strictly speaking, must be called food.” We have also exposed the absurdity of divers propositions, at which logic, physiology, and fact have “shrugged their shoulders” in turn. Finally, we have “rescued a scientific question”; and have shown, we think, that he has utterly failed to demonstrate the “Physiological Errors of Teetotalism.” We have detained the reader much longer than we would have desired. But it was necessary that our wily opponent should be closely followed through the windings of his errant logic, lest he might adroitly skulk for shelter behind an inconsequent conclusion. We must, however, in justice, admit that he has laid the manufacturers and venders of alcoholic drinks under no slight obligation; and if it should be deemed expedient to publish his article in a separate form, we suggest that it be entitled, “An Essay on the Effects of Alcohol; for Distribution by Brewers and Distillers.”

Before finally dismissing this subject, we would enter our protest against the carelessness of remark — if it deserve no severer epithet — in which some medical men are accustomed to indulge in regard to the physiological effects of the habitual use of alcohol. No writer but a thorough physiologist can do justice to this subject. Yet we often hear announced, in a magisterial style, opinions on this subject which are utterly opposed to facts and to physiology. When a physician sets the example of the daily use of alcoholic drinks, and assigns as the reason, that he, though in health, requires the beneficial

physiological effects of alcohol, it really becomes a matter of charity, if we suppose him sincere, to instruct him that no *valid* physiological reason has been or can be given for the notion that the habitual use of alcohol is beneficial to a person in health. We have no quarrel with him who drinks habitually; that is not our affair. But let him not impress Physiology to screen him in the practice. She abhors such service. Let him not "drink on pretexts"; but frankly admit that he drinks merely for the excitement alcohol produces; that he incurs a risk in so doing, hoping to avoid the so frequent consequences; but that he would not advise another to do the same, lest he might yield to the temptation. This is fair and honorable; and this is the only ground that medical men who habitually drink alcoholic liquors can take, without impeaching either their knowledge or their candor. We confess ourselves indignant, when we see Physiology distorted and mutilated till her most intimate disciples can scarcely recognize her, and then debased to do battle against a cause emphatically her own; and we have no excuse for those who, whether prompted by ignorance or by their own interests, thus lay unholy hands upon her. In her behalf would we address to all such the blended supplication and command of the Sibyl,—

"Procul, O, procul este, profani!"

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ART. XI.—*The Principles of Political Economy applied to the Condition, the Resources, and the Institutions of the American People.* By FRANCIS BOWEN, Alford Professor of Moral Philosophy and Civil Polity in Harvard College. Boston: Little, Brown, & Co. 1856. 12mo. pp. 546.

The *Statics* of the body politic considered as a wealth-producing body constitute Political Economy; its *Dynamics* are all comprehended in the one maxim, *Laissez-faire*,—"Let alone." The physical science of Statics treats of equilibrium, its conditions and its hinderances,—of friction, the stiffness